Evaluation of Istation's Early Reading Assessment and Curriculum in Spartanburg County School District 7

Final Report

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February 2021

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Specializing in independent program evaluations, CRRE's research department evaluates the impacts of programs and services through four levels of evaluation studies: (1) design and implementation quality, (2) development, (3) efficacy, and (4) effectiveness. In terms of content areas, CRRE specializes in evaluations of educational technology and technology integration, social-emotional learning, professional development, school reform, programs for English learners, and multiple core subject curriculum areas. CRRE staff work with educators and program developers to design studies that are consistent with their organization's objectives and that meet the specific needs of clients. We evaluate programs locally, nationally, and internationally.

CRRE researchers include numerous Johns Hopkins University professors and research staff with backgrounds including quantitative, qualitative, and evaluative research. The research team has published over 200 research documents, and within the past five years alone, CRRE has conducted over 45 program evaluations nearing $10 million.

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EXECUTIVE SUMMARY: Evaluation of Istation's Early Reading and Advanced Reading Assessments in Spartanburg District 7: Achievement Analysis Report

In June 2019 The Center for Research and Reform in Education (CRRE) at Johns Hopkins University contracted with Istation to conduct a mixed-methods evaluation study of the implementation and impacts on student achievement of Istation's ISIP Early Reading (ISIP ER) and Advanced Reading (ISIP AR) assessments in Spartanburg County School District 7 (SCSD-7). The present Phase II report examines findings from quantitative analyses of relationships between ISIP scores and ELA scores on state assessments (SC READY) and reading scores (NWEA MAP). The Phase I report examined findings from a teacher survey and case study visits to five SCSD-7 schools.

The longitudinal study was designed to address the following research questions:

1. What is the relationship of the ISIP ER assessment program to students' achievement as measured on the state ELA assessment (SC READY) in the past three years of program implementation (2017-18, 2018-19, and 2019-20)?
    a. To what degree is there alignment between ISIP ER/AR tiers and SC READY proficiency levels?
    b. Do outcomes vary by tier and for different usage levels?
    c. Do outcomes vary by reading domain (i.e., text fluency, comprehension, alphabetic decoding)?
    d. Do outcomes vary for different student subgroups (e.g., grade levels, SPED, FRL, ethnicity, gender, ELL)?
    e. Do outcomes (a-d) vary by year?
    f. Do outcomes (a-e) vary by school?
2. How does growth in students' achievement on the MAP reading assessment compare to that of a virtual control group?
    a. To what degree are ISIP ER/AR scores predictive of MAP performance?
    b. Do outcomes vary for different student subgroups?
    c. Do outcomes vary by year?
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3. What implementation practices are used overall and by higher-performing schools?
4. What are the perceptions of stakeholders and participants regarding program implementation, activities, benefits, and challenges:
    a. Teachers?
    b. Principals?
    c. Special education staff?
    d. ELL staff?
    e. RTI and other support staff?
    f. District leaders (superintendent, elementary school curriculum director, special education director, ELL director, others)?

This report provides methodology and results obtained for research questions 1 and 2 above.

The purpose of this phase of the study was to examine the association between ISIP scores and student achievement, as measured by NWEA MAP reading and SC READY ELA scores, as well as to compare SCSD-7 student growth on the MAP reading assessment to otherwise similar students who did not use Istation. The study sample consisted of students from SCSD-7, a small-city school district of about 7,400 students. The majority of its students (53%) are White, with Black students (40%) constituting the next largest ethnic subgroup. Approximately 70% of the students come from economically disadvantaged families, 7% are Limited English Proficient students, and 11% are disabled/special education students.

This study reports findings from Istation assessment and usage data, as well as student achievement data, in the form of NWEA MAP reading and SC READY ELA scores. Key findings of the current study include:

Patterns of ISIP gains and usage were comparable to national norms. Average usage statistics were fairly consistent in the 2016-17 through 2018-19 school years, with students generally averaging 15-16 hours of total Istation usage each year. All usage metrics declined in the 2019-20 school year, which may be attributable at least in part to the Covid-19 pandemic. ISIP score gains from the fall to spring of each school year were generally comparable to or slightly smaller than national norms. Score gains were largest for grades K-1 students, consistent with national norms.

ISIP scores were positively associated with NWEA MAP reading and SC READY ELA scores. ISIP ER and AR scores were consistently positively associated with both NWEA MAP reading scores and SC READY ELA scores across all years of ISIP administration. These significant positive associations were observed both with and without controlling for demographic variables and prior achievement (when available). Overall, ISIP scores showed the most predictive validity with MAP reading and SC READY ELA scores, with observed correlations generally exceeding +.70. Associations between Istation usage and achievement varied by school year. Observed correlations between total Istation usage and minutes and ELA achievement were generally significant and positive, but weak in magnitude. However, quartiles of total Istation usage minutes were significantly positively associated with MAP reading scores in 2016-17 and 2018-19, and were significantly positively associated with SC READY ELA scores in 2017-18.

Spartanburg Istation students outgained comparison students on the MAP reading assessment, meeting criteria for What Works Clearinghouse (WWC) Moderate Evidence, or ESSA Tier 2 standards. Over two cohorts of students, Istation usage was associated with greater MAP reading gains from spring 2017 to spring 2019, in relation to virtual comparison students identified by NWEA's Similar Schools Report. Across both cohorts, Istation students averaged a nearly one-point larger gain in MAP reading scores than did comparison students. This advantage was especially pronounced in Cohort 1, as Istation students averaged greater than a 2.5-point larger gain in MAP reading scores in relation to comparison

students. In addition, a generally positive association between school-level average Istation usage and MAP reading gains in relation to comparison students was found in SCSD-7 elementary schools. As SCSD-7 students were matched with virtual comparison students on the basis of prior reading achievement and demographic variables, and a sufficiently large sample size was used, the results support the conclusion that Istation usage is related to larger reading achievement gains, in relation to non-Istation users. Further, the results of this study meet the criteria for meeting WWC Standards with Reservations, as well as those for "Moderate" evidence of the efficacy of Istation in improving student reading performance per the Every Student Succeeds Act (ESSA).

Recommended Istation usage was associated with greater MAP reading gains in relation to comparison students. Students in schools that met Istation's recommended weekly usage levels consistently showed greater average MAP reading gains than did otherwise similar comparison students who did not use Istation. Aggregated effect sizes for Istation students' scores in schools that met recommended usage guidelines ranged from +0.20 to +0.50. More schools met recommended usage guidelines for students in the first cohort than in the second cohort. In general, students in the first cohort showed more positive MAP reading gains in relation to comparison students than did students in the second cohort.

Conclusions

- ISIP ER and AR scores were strong predictors of NWEA MAP reading scores and SC READY ELA scores, with observation correlations generally above +.70.
- The predictive validity of ISIP scores remained high, even after controlling for prior achievement and demographic variables.
- Spartanburg Istation students significantly outgained comparison students on the MAP reading assessment from spring 2017 to spring 2019. This advantage was most apparent in the first (younger) cohort of students, and meets standards for WWC ESSA Tier 2 evidence.
- Students in schools that met recommended Istation guidelines generally experienced larger MAP reading gains than did otherwise similar comparison students.
- Associations between total ISIP usage and ELA achievement varied across years and test. Significant positive associations between total Istation usage and MAP reading scores were found in the 2016-17 and 2018-19 school years. Significant positive associations between total Istation usage and SC READY ELA scores were found in the 2017-18 school year. These associations held with other usage variables, including curriculum usage and number of sessions.
- ISIP ER and AR within-year scoring gains were generally comparable to national norms.
- The results of the present analyses give evidence for the potential use of ISIP ER and AR assessment scores as meaningful predictors of both state standardized test performance and MAP reading test performance.

Evaluation of Istation's Early Reading and Advanced Reading Assessments in Spartanburg District 7: Achievement Analysis Report

In June 2019 The Center for Research and Reform in Education (CRRE) at Johns Hopkins University contracted with Istation to conduct a mixed-methods evaluation study of the implementation and impacts on student achievement of Istation's ISIP Early Reading (ISIP ER) and Advanced Reading (ISIP AR) assessments in Spartanburg County School District 7 (SCSD-7). The present Phase II report examines findings from quantitative analyses of relationships between ISIP scores and ELA scores on state assessments (SC READY) and formative assessments (NWEA MAP). The Phase I report examined findings from a teacher survey and case study visits to five SCSD-7 schools.

The ISIP ER assessment, developed by Dr. Joseph Torgeson, Dr. Patricia Mathes, and Dr. Jeannine Herron, is a validated computer-based adaptive testing system that provides benchmark and continuous progress monitoring of student performance. Key indicators include:

- Assessment in critical domains of reading in all tested grades
- Assessment of skills most predictive of future reading success
- Assessment of progress in each area relevant to a larger domain
- Provision of a comprehensive snapshot of reading ability

Testing occurs in a game-like and engaging environment. Scoring results are obtained and reported to teachers immediately after test completion. The assessments are nationally normed every three to five years. ISIP ER levels were originally reported on a three-tier normative grouping, based on scores associated with the 20th and 40th percentiles, similar to the Response to Intervention (RTI) model. During the 2018-19 school year, however, the reporting system was changed by Istation to a five-tier grouping model.

SCSD-7 adopted Istation for assessment and learning support (via the Curriculum) in school year 2014-15. It was used in its four elementary schools and one middle school.

The two phases of this longitudinal study were designed to address the following research questions:

1. What is the relationship of the ISIP ER assessment program to students' achievement as measured on the state ELA assessment (SC READY) in the past three years of program implementation (2017-18, 2018-19, and 2019-20)?
    a. To what degree is there alignment between ISIP ER/AR tiers and SC READY proficiency levels?
    b. Do outcomes vary by tier and for different usage levels?
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   e. Do outcomes (a-d) vary by year?
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2. How does growth in students' achievement on the MAP reading assessment compare to that of a virtual control group?

   a. To what degree are ISIP ER/AR scores predictive of MAP performance?
   b. Do outcomes vary for different student subgroups?
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   a. Teachers?
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   f. District leaders (superintendent, elementary school curriculum director, special education director, ELL director, others)?

This report provides methodology and results obtained for research questions 1 and 2 above. The Phase I report provides methodology and results related to research questions 3 and 4 above.

Method

Research Design

To address the research questions, we analyzed ELA state test data from the 2017-18, 2018-19, and 2019-20 school years in Spartanburg County School District 7. Specifically, ELA scores from the SC READY exams and from the NWEA MAP reading assessment were used. Correlational analyses were conducted that examined the inter-relationships between ISIP scores, usage, ELA SC READY, and NWEA MAP test scores. We also conducted descriptive analyses to identify patterns of growth in ISIP scores within and between school years.

In the quasi-experimental design (QED) component of the study, we compared district growth on the NWEA MAP assessment with that of a similar-schools comparison group (see description below). SC READY tests are offered starting in grade 3, while NWEA MAP is offered in all elementary grades. The Istation ER assessment system is administered to students in Grades K-3, while the Istation AR assessment system is administered to students in grades 4-8.

Participants

Spartanburg District 7 is a "small city" district of approximately 7,400 students in northeast South Carolina. The majority of its students (53%) are White, with Black students (40%) constituting the next largest ethnic subgroup. Approximately 70% of the students come from economically disadvantaged families, 7% are Limited English Proficient students, and 11% are disabled/special education students. For the purposes of the present study, five schools support the grade levels that have participated in ISIP ER and ISIP AR testing for multiple years. The schools are fairly diverse in student demographics. Demographics by school can be found in Appendix A.

Student demographics for participants in this evaluation are displayed in Table 1. "Other Race" is defined as ethnicities other than White, Black, and Hispanic/Latino, which are the three dominant ethnicities in SCSD-7. The analytic sample generally had smaller proportions of White students and larger proportions of Black students than did the overall district. Proportions of economically disadvantaged, special education, and LEP students were generally similar to district-wide proportions.

Table 1
Student characteristics for analytic sample

Group	
% Black	55.24
% White	34.52
% Hispanic	7.47
% Other Race	10.25
% Female	51.05
% Economically disadvantaged	64.07
% Students with Disabilities/SPED	14.11
% ELs	7.51
N	2,196

For the quasi-experimental study, we examined two particular cohorts in a set of analyses comparing growth in MAP reading scores by Spartanburg students using Istation with otherwise similar students not from Spartanburg who did not use Istation. Specifically, we examined grades 1 and 2 students from spring 2017, who were then grades 3 and 4 students respectively, in grades 3 and 4. Table 2 shows the average spring 2017 (pretest) scores for Spartanburg Istation students and comparison students identified by the Similar Schools Report. Baseline equivalence is met if the standardized mean difference is less than 0.25. Standardized mean differences between Istation and comparison students were less than 0.01, indicating that baseline equivalence has been satisfied. The extremely small size of these differences was expected, as prior achievement was one of the variables NWEA used to select comparison students.

Table 2
Baseline equivalence on spring 2017 MAP reading scores

	Istation Mean (SD)	Control Mean (SD)	Adjusted T v C Difference	Pooled Unadjusted SD	Stan. Mean Diff.
Cohort 1	176.74 (14.77)	176.64 (14.58)	0.10	14.68	0.008

	Istation Mean (SD)	Control Mean (SD)	Adjusted T v C Difference	Pooled Unadjusted SD	Stan. Mean Diff.
Cohort 2	188.69 (15.62)	188.61 (15.41)	0.08	15.51	0.006
All students	183.33 (16.35)	183.23 (16.17)	0.10	16.25	0.006

Note: SD=standard deviation

Measures

Data sources for the current study included student ISIP scores, student usage data, student demographic data, student SC READY ELA achievement data, and NWEA MAP Reading achievement data. Student achievement data from four years were analyzed to examine relationships between ISIP scores and usage and ELA test scores, both restricted to given years and spanning multiple years to examine growth.

ISIP ER and AR Scores. Overall and sub-domain ISIP data were obtained for students in grades K-5 who were tested by ISIP in any of school years 2016-17, 2017-18, 2018-19, or 2019-20. The sub-domains included Alphabetic Decoding, Comprehension, Letter Knowledge, Listening Comprehension, Phonemic Awareness, Spelling, Text Fluency, and Vocabulary. Comprehension, Spelling, Text Fluency, and Vocabulary subtests are offered in all grades, while the other sub-tests are generally only offered in Grades K and 1. For the purpose of beginning and end-of-year comparisons, fall and spring scores were derived from monthly ISIP scores. The September ISIP score was used as the fall score; if this was missing, then the first non-missing score from October, August, and November, respectively, was used as the fall score. The spring score was defined as the May ISIP score; if this was missing, then the first non-missing score from June and April was used as the spring score.

ISIP ER and AR scores are nationally normed across grades, meaning that similar numerical scores across grades, on a particular test (ER or AR), can be interpreted as reflecting the same ability level (Mathes, Torgesen, & Herron, 2016). For example, a Grade 2 student scoring at 200 and a Grade 3 student scoring at 200 on the ISIP ER test would be indicative of performance at the same ability level. Score ranges vary by grade level; Table 3 shows the range of possible scores for the ISIP ER and AR scores in grades K-5 in the observed data. Grades K-3 are ISIP ER scores, while grades 4-5 are ISIP AR scores.

Table 3
ISIP ER and AR score ranges, by grade

Grade	ISIP Score range
K	142-262
Grade 1	136-273
Grade 2	166-296
Grade 3	167-371
Grade 4	813-2720
Grade 5	1079-2529

Usage data. Istation usage data were obtained for all students who were tested by Istation in any of the school years 2016-17, 2017-18, 2018-19, or 2019-20. General Istation usage consists of time spent both on ISIP assessments and Istation curriculum. Usage data for each student included:

- Total Istation usage (in minutes)
- Total Istation curriculum usage (in minutes)
- Home Istation usage (in minutes)
- Total number of Istation sessions completed
- Number of Home Istation sessions completed

Monthly usage data were summed across school years to provide total usage and number of Istation sessions for each of the four school years considered in these analyses. Home usage metrics were generally zero or very close to zero for most participants, so we excluded these metrics from analysis.

Student achievement. Student achievement data were the standardized SC READY and NWEA MAP exams administered to all district students. SC READY scores were obtained from the 2017-18 and 2018-19 school years. SC READY exams are administered annually during the last 20 instructional days of the school year. Scores are vertically scaled, but score ranges for each of the four achievement levels vary by grade. Table 4 shows the score ranges for each achievement classification on the SC READY assessment for students in grades 3-5.

Table 4
SC READY ELA Score Ranges, by grade

	Does Not Meet	Approaches	Meets	Exceeds
Grade 3	100-358	359-451	452-539	540-825
Grade 4	100-418	419-508	509-592	593-850
Grade 5	100-449	450-557	558-652	653-875

NWEA MAP data were obtained from each of the 2016-17 through 2019-20 school years. NWEA MAP assessments are administered annually to all district students in grades K-5. MAP RIT scores are also vertically scaled so that scores can be directly compared across grade levels, although it is generally expected that students' scores will increase as they progress through grade levels. While MAP RIT reading scores can be as high as 265, we present the observed ranges of scores for RIT reading scores in 2019-20 for SCSD-7 students in Table 5.

Table 5
MAP RIT reading scores ranges, by grade

Grade	MAP RIT reading score range
K	120-186
Grade 1	130-202
Grade 2	134-218
Grade 3	141-232
Grade 4	149-235

Grade	MAP RIT reading score range
Grade 5	149-251

Analytical Approach

Data for students in grades K-5 were analyzed by descriptively examining patterns in ISIP ER scores and usage, as well as relationships between ISIP variables (scores and usage) and ELA standardized test scores. Correlation and multiple linear regression were used to determine the relationship between ISIP scores and ELA scores, both in individual years and when examining growth over time. For example, 2017-18 ISIP scores were examined to explore potential relationships with 2018-19 SC READY and NWEA MAP reading scores, controlling for prior achievement scores. Demographic variables such as gender, ethnicity, grade level, school, EL status, economically disadvantaged status, and special education status were initially included in all models.

We also conducted a QED (quasi-experimental design) on NWEA MAP reading scores, comparing reading score gains over time. As there were no comparison schools available in SCSD-7, we obtained a Similar Schools Report from NWEA for the purpose of this QED. A Similar Schools Report contains data from students who, relative to the intervention (i.e., Spartanburg) sample, come from schools in a similar area (i.e., urban, suburban, rural) with similar percentages of FRL students. In addition, individual students are matched on the basis of grade level and prior MAP achievement, as well as demographics including gender and ethnicity. Each student is matched with multiple comparison students (as few as 3, and as many as 51), on the basis of these variables. This creates a "virtual comparison" group of students for each SCSD-7 student, allowing for a comparison of MAP score growth between SCSD-7 students who used Istation and otherwise similar students who did not use Istation. The data included in the Similar Schools Report included MAP reading scores from spring 2017 and spring 2019, as well as relevant summary statistics for the virtual comparison group. This QED meets WWC Standards with Reservations and ESSA Tier 2 standards by meeting the baseline equivalence criterion, using the spring 2017 MAP reading assessment, as well as using a sample size of greater than 350 students.

Results

Student Istation usage

Total usage statistics reflect time spent on ISIP ER and AR assessments, as well as Istation curriculum use. We report average total minutes of usage, as well as average minutes of curriculum use. Table 6 displays Istation usage statistics for all elementary school students who participated in either NWEA MAP or SC READY testing in any of the 2016-17, 2017-18, 2018-19, or 2019-20 school years. Breakdowns of usage by year and grade can be found in Appendix B. Patterns of usage by grade level varied by year, but generally, students in grades K-1 had the highest levels of usage, while grades 4 and 5 students generally had the lowest levels of usage.

Table 6
Istation usage amounts for students, by school year

	Mean	Standard Deviation	Minimum	Maximum
2016-17 (*n* = 706)				
Total minutes of usage	990.19	713.07	41.42	4149.80
Curriculum usage minutes	816.72	671.73	4.15	3606.02
Number of sessions completed	41.90	30.09	3	175
2017-18 (*n* = 1028)				
Total minutes of usage	911.23	779.79	9.67	4581.62
Curriculum usage minutes	850.14	849.07	0.02	4739.05
Number of sessions completed	45.83	34.73	1	180
2018-19 (*n* = 1769)				
Total minutes of usage	973.02	714.38	2.90	4743.85
Curriculum usage minutes	817.19	697.45	0.38	4471.02
Number of sessions completed	51.16	34.79	1	200
2019-20 (*n* = 1462)				
Total minutes of usage	670.59	497.57	0.58	3029.77
Curriculum usage minutes	539.45	480.69	0.27	2885.73
Number of sessions completed	35.93	23.58	1	136

Note: Only students with a non-missing SC READY or MAP test score for a given year were included in these analyses.

Usage was generally consistent across the 2016-17 through 2018-19 school years, with students averaging approximately 15-16 hours of usage across each of these years. Average usage was considerably smaller in 2019-20, with students only averaging just over 11 hours of Istation usage. Curriculum usage was generally about 1-3 hours less than total Istation usage, on average, across all four school years. Students generally completed larger numbers of sessions, on average, in later school years, peaking in 2018-19, with an average of over 51 completed Istation sessions. As with the other usage metrics, a drop was observed in 2019-20, with students completing an average of approximately 36 Istation sessions. It is important to consider that, in 2019-20, usage metrics dropped precipitously after March, due to Covid-19, meaning that usage metrics generally only measured total usage through March, with only a small percentage of students registering non-zero usage in April-June.

Achievement gains

In this section, we present descriptive analyses of ISIP overall performance, by grade and year, followed by descriptive analyses of SC READY ELA and NWEA reading score gains for students with non-missing ISIP scores.

We begin with descriptive analyses of ISIP learning gains from fall to spring in each of the 2016-17 through 2019-20 school years. Average overall ISIP scores are presented in Table 7, and ISIP scores from the Comprehension, Spelling, Text Fluency, and Vocabulary subdomains are presented in Appendix C. Average ISIP ER gains tended to be larger in the earlier grades, although patterns of gains were generally inconsistent across domains and years. Consistent with Istation usage in other districts, most students who participated in SC READY and NWEA MAP testing participated mainly in these four subdomains. Since we are examining four years of test

scores, we break down ISIP scores in each year by grade, allowing for descriptive analysis by cohort. Grade levels in each table correspond to a student's grade in that particular school year; thus, K in 2016-17 corresponds to grade 1 in 2017-18, grade 2 in 2018-19, and grade 3 in 2019-20. Recall that grades K-3 participate in ISIP ER testing, while grades 4-5 participate in ISIP AR testing; therefore, scores for grades K-3 students will be on a different scale than will scores for grades 4-5 students. Note that we present ISIP learning gains from fall to winter in 2019-20, due to the Covid-19 pandemic.

Table 7
Average ISIP Overall performance, by grade and year

Grade	Mean Fall	Mean Spring	Mean Change
2016-17			
K grade (n = 400)	179.33	195.52	16.19
1st grade (n = 443)	200.74	215.79	15.05
2nd grade (n = 566)	221.87	232.22	10.35
2017-18			
K grade (n = 443)	181.64	193.89	12.25
1st grade (n = 409)	202.38	216.03	13.65
2nd grade (n = 458)	223.72	231.92	8.20
3rd grade (n = 514)	234.84	240.42	5.55
2018-19			
K grade (n = 413)	183.09	195.73	12.64
1st grade (n = 482)	199.88	213.00	13.12
2nd grade (n = 509)	221.90	230.95	9.05
3rd grade (n = 411)	234.94	241.28	6.34
4th grade (n = 504)	1779.32	1849.06	69.74
2019-20		Mean Winter	
K grade (n = 427)	182.07	198.29	16.22
1st grade (n = 419)	200.79	212.04	11.25
2nd grade (n = 413)	221.82	232.38	10.56
3rd grade (n = 403)	235.79	243.10	7.31
4th grade (n = 321)	1803.73	1907.81	104.08
5th grade (n = 379)	1870.55	1934.11	63.56

Both average MAP scores and fall-to-winter gains generally remained consistent across time. ISIP ER gains tended to be largest for grades K and 1, with average fall-to-winter gains ranging from 11 to 16 points. ISIP ER gains were somewhat smaller for students in grades 2 and 3, with average fall-to-winter gains ranging between 5 and 11 points. This is consistent with ISIP ER norms, as students in grades K-1 are expected to experience larger fall to spring score increases than are students in grades 2-3. ISIP AR scores and gains were generally larger in 2019-20 than 2018-19. Overall, average within-year gains tended to be largest in 2016-17 and 2019-20 and smallest in 2017-18 and 2018-19.

2017-18 and 2018-19 SC READY ELA. Table 8 presents average SC READY ELA scores in spring of 2018 and 2019 for students who have non-missing spring 2017 ISIP ER or AR assessment scores.

Table 8
Average SC READY ELA performance, Spring 2018 – Spring 2019, by cohort

Cohort	Spring 2018	Spring 2019	Mean change
Grade 3 (2018-19)	n/a	425.94	n/a
Grade 4 (2018-19)	422.85	475.52	52.67

Average SC READY scores were generally about 15 to 30 points lower than statewide averages. Year-to-year gains between grades 3 and 4 generally average between 50 and 60 points, so the 53-point increase observed in grade 4 SC READY scores is consistent with statewide SC READY ELA patterns.

NWEA MAP Reading. Table 9 shows mean NWEA MAP Reading scores in school years 2016-17 through 2019-20 for students who have at least one non-missing ISIP ER or AR score over these school years.

Table 9
Average spring NWEA MAP Reading performance, by year and cohort.

Cohort (2019-20)	Mean Spring 2017	Mean Spring 2018	Mean Spring 2019	Mean Winter 2020
Grade 1	n/a	n/a	n/a	166.24
Grade 2	n/a	n/a	173.81	178.73
Grade 3	n/a	174.28	186.10	192.51
Grade 4	175.80	186.24	196.52	201.04
Grade 5	187.35	195.90	202.22	206.56

Over all four years, student MAP Reading scores consistently increased, on average. Average increases were generally smallest between spring 2019 and winter 2020; however, this may be attributable to students not having an entire school year to demonstrate growth in 2019-20. Students generally gained 5 to 12 points between school years, indicating consistent growth over time. For example, current grade 4 students averaged approximately 10-point gains in each of the first two years, followed by a 5-point increase from spring 2019 to winter 2020 (grade 3 to grade 4). Districtwide, average student scores were generally very similar to 2020 NWEA MAP Reading norms. Average scores for grades 2-5 students were generally 1 to 3 points below 2020 norms, while average scores for grades K-1 students were generally within one point of 2020 norms. Year-to-year average score increases were generally comparable to or slightly smaller than 2020 NWEA MAP Reading norms.

Relationship between ISIP ER/AR scores and ELA score gains

In this section, we present Pearson correlations between ISIP overall scores and ELA achievement, as measured by SC READY ELA and MAP reading scores, followed by regression analyses of the predictive utility of ISIP scores on ELA achievement scores, after controlling for demographic variables, prior achievement, grade, and school.

ISIP and ELA achievement. Tables 10 and 11 show the Pearson correlations between ISIP scores and achievement, as measured by SC READY and NWEA MAP Reading scores. Table 10 presents these associations for 2017-18 scores and Table 11 presents the same associations for 2018-19 scores.

Table 10
Correlations between ISIP Overall and ELA achievement scores, 2017-18

	SC Ready	NWEA MAP
ISIP Overall		
Grade 1 (*n* = 278)	n/a	.79***
Grade 2 (*n* = 278)	n/a	.79***
Grade 3 (*n* = 318)	.69***	.72***

Note: *** p < .01, n/a indicates no data available to estimate the association.

Table 11
Correlations between ISIP Overall and ELA achievement scores, 2018-19

	SC Ready	NWEA MAP
ISIP Overall		
Grade 2 (*n* = 408)	n/a	.80***
Grade 3 (*n* = 313)	.75***	.75***
Grade 4 (*n* = 376)	.75***	.74***

Note: *** p < .001, n/a indicates no data available to estimate the association.

ISIP Overall scores were generally strongly positively correlated with both SC READY ELA and NWEA MAP Reading scores in all grades, and in both years. Correlations between ISIP and SC Ready were slightly stronger in 2018-19, ranging from +.69 to +.76. Correlations between ISIP and NWEA MAP Reading scores ranged between +.73 and +.80. These patterns of significant positive correlations indicate that ISIP scores have high predictive validity within school years and account for approximately 50% of the variance in both SC READY ELA and NWEA MAP Reading scores. These associations were consistent across both grade level and school year.

We also examined predictive validity by analyzing the correlations between ISIP scores and next-year ELA achievement. Table 12 shows the Pearson correlations between spring ISIP scores and ELA achievement. Specifically, we examine associations between spring 2017 ISIP scores and spring 2018 ELA achievement scores, along with spring 2018 ISIP scores and spring 2019 ELA achievement scores. Table 13 shows associations between spring 2019 ISIP scores and winter 2020 NWEA MAP scores only, as there were no SC READY scores available for the 2019-20 school year.

Table 12
Correlations between ISIP and ELA achievement scores

	ISIP				
Achievement	Overall	Comprehension	Spelling	Text Fluency	Vocabulary
2016-17 ISIP with 2017-18 achievement					
SC Ready	.74	.73	.60	.71	.76

			ISIP		
NWEA MAP	.82	.74	.65	.68	.79
2017-18 ISIP with 2018-19 achievement					
SC Ready	.70	.69	.56	.71	.69
NWEA MAP	.82	.73	.65	.67	.78

Note: all observed correlations were significant with $p < .001$.

Table 13
Correlations between 2018-19 ISIP and 2019-20 NWEA MAP Reading scores

			ISIP ER		
Achievement	Overall	Comprehension	Spelling	Text Fluency	Vocabulary
NWEA MAP	.84	.76	.71	.67	.80
			ISIP AR		
NWEA MAP	.78	.64	.69	.64	.70

Note: all observed correlations were significant with $p < .001$.

The correlations between ISIP overall and domain scores and ELA achievement scores were generally moderately to strongly positive. Overall ISIP and NWEA MAP scores intercorrelated at a strong +.82 in both 2017-18 and 2018-19, indicating that ISIP scores account for nearly 65% of the variance in NWEA MAP reading scores. In addition, ISIP AR scores correlated with NWEA MAP reading scores at a strong positive +.78. These correlations provide substantive evidence of the predictive validity of ISIP scores in relation to NWEA MAP reading scores. Overall ISIP scores were also strongly positively correlated to SC READY scores, with observed correlations of +.70 and +74. This indicates that overall ISIP scores explain approximately 50% of the variation in SC READY scores, providing substantive evidence of the predictive validity of ISIP scores in relation to SC READY ELA scores in the next year.

Correlations between ISIP domain scores and ELA achievement scores were also generally moderately to strongly positive and statistically significant. Vocabulary scores generally had the strongest correlations with ELA achievement, with observed correlations of +.70 to +.80 with NWEA MAP reading scores and +.69 to +.76 with SC READY ELA scores. ISIP comprehension scores also correlated with both ELA achievement scores to a similar degree. Spelling scores generally had the weakest relationships with ELA achievement, with observed correlations of +.65 to +.71 with NWEA MAP reading scores and +.56 to +.60 with SC READY ELA scores. The observed patterns of associations between ISIP domain scores and ELA achievement were consistent with observed relationships between ISIP scores and other achievement measures (i.e., PARCC). These associations provide additional evidence for the predictive validity of ISIP domain scores in relation to ELA achievement. First grade overall ISIP scores correlate with third grade NWEA MAP scores at +.67 to .74, and second grade scores correlate at +.74 to +.78. For the SC READY, first grade overall ISIP scores correlate at +.66, and second grade overall ISIP scores correlate with third grade SC READY scores at +.75. Additional grade-level correlations at the overall and subtest level can be found in Appendix D.

Relationship between ISIP scores and SC READY achievement gains

In this section, we present regression analyses of the predictive utility of ISIP scores on ELA achievement, above and beyond the relationship between current-year and previous-year ELA achievement. For analyses predicting 2019 SC READY scores, 2018 SC READY scores are used as a control for prior achievement, while for analyses predicting 2018 SC READY scores, spring 2017 NWEA MAP reading scores are used as the prior achievement control, as we do not have SC READY scores from spring 2017, and SC READY ELA and MAP reading scores are strongly correlated with each other, with observed Pearson correlations between SC READY ELA and MAP reading scores ranging between +.83 and +.89. These regression analyses also include demographic variables, as well as dummy variables for grade and school, which allowed for the estimation of and control for grade and school effects. Demographic variables were generally not significantly associated with any ELA achievement outcomes, although females scored significantly higher than males in a couple of isolated analyses. Tables 14 and 15 show these associations between scores in spring 2018 and spring 2019, respectively.

Table 14
Associations between ISIP scores and SC Ready scores, spring 2018

Spring 2018 ISIP Score	Estimate	Standard error	Model R^2
Overall ISIP (*n* = 279)	0.703***	0.168	.751
Comprehension ISIP (*n* = 288)	0.811***	0.156	.757
Spelling ISIP (*n* = 284)	0.544**	0.182	.742
Text Fluency ISIP (*n* = 279)	0.424***	0.092	.754
Vocabulary ISIP (*n* = 305)	0.805***	.0121	.767

Note: ** p < .01, *** p < .001

ISIP overall and subdomain scores were significantly positively associated with spring 2018 SC READY ELA scores. The regression estimates in these analyses may be interpreted as the gain in SC READY score associated with a one-point increase in ISIP score. Thus, a one-point increase in spring 2018 overall ISIP score was associated with a 0.7-point increase in spring 2018 SC READY score. One-point score increases on the comprehension and vocabulary ISIP assessments were associated with the largest increases in SC READY scores, at just over 0.8 points. Spelling and Text Fluency domain scores were associated with the smallest increases in SC READY scores; however, it is important to note that the Text Fluency ISIP is scored on a different scale than the other subdomain tests, so this regression estimate is not necessarily directly comparable to the other subdomain estimates.

Table 15
Associations between ISIP scores and SC Ready Scores, spring 2019

Spring 2019 ISIP Score	Estimate	Standard error	Model R^2
Overall ISIP (*n* = 329)	0.149***	0.021	.754
Comprehension ISIP (*n* = 339)	0.156***	0.018	.770
Spelling ISIP (*n* = 357)	0.067***	0.017	.722
Text Fluency ISIP (*n* = 329)	0.512***	0.058	.773
Vocabulary ISIP (*n* = 363)	0.141***	0.017	.749

Note: *** p < .001

Similar patterns of associations were found between spring 2019 ISIP and SC READY scores. One important difference is that, due to the cohort being examined in this analysis, ISIP AR scores were used instead of ISIP ER scores. AR scores are on a different scale and have a much larger range of possible scores than do ER scores. This means that non-standardized regression estimates may appear to be depressed, when compared to analyses using ISIP ER scores. However, all associations are still significant and positive, and standardized regression coefficients are actually larger in examining 2019 scores than in 2018 scores, thus indicating stronger associations between ISIP and SC READY scores in 2019 than in 2018. Non-standardized regression estimates may still be interpreted as before; thus, a one-point increase in overall ISIP score is associated with a nearly 0.15-point increase in SC READY score. As with the 2018 analyses, the Text Fluency score is on a different scale than the other subdomain scores, and thus, the regression estimate cannot be directly compared to those from other subdomains.

Relationship between ISIP scores and NWEA MAP achievement gains

We also examined the association between ISIP score and NWEA MAP reading scores. As with previous analyses, we performed these analyses by year, and since we had multiple cohorts of students in each year, we further separate tables of results by cohort (see Tables 16 and 17). Prior knowledge was controlled for by including prior year spring MAP reading scores in the model. For example, we controlled for spring 2018 MAP reading scores in analyses using spring 2019 MAP reading scores as the outcome variable. We include demographic variables, as well as school dummy variables, in all analyses.

Table 16
Associations between 2017-18 ISIP scores and Spring 2018 NWEA MAP scores, by grade

ISIP Score	Estimate	Standard error	Model R^2
Grade 2			
Overall ISIP (*n* = 247)	0.285***	0.036	.753
Comprehension ISIP (*n* = 256)	0.198***	0.028	.743
Spelling ISIP (*n* = 250)	0.184***	0.038	.713
Text Fluency ISIP (*n* = 247)	0.129***	0.017	.745
Vocabulary ISIP (*n* = 269)	0.138***	0.028	.721
Grade 3			
Overall ISIP (*n* = 279)	0.130***	0.025	.769
Comprehension ISIP (*n* = 288)	0.125***	0.024	.766
Spelling ISIP (*n* = 284)	0.112***	0.027	.760
Text Fluency ISIP (*n* = 279)	0.072***	0.013	.769
Vocabulary ISIP (*n* = 305)	0.117***	0.018	.779

Note: *** $p < .005$

Patterns of associations between spring 2018 ISIP overall and subdomain scores and NWEA MAP scores were all significant and positive. As with previous analyses, the regression estimates can be interpreted as the expected increase in spring 2018 NWEA MAP reading score associated with a one-point increase in ISIP score. For grade 2 students, a one-point increase in

overall ISIP score was associated with a 0.29-point increase in NWEA MAP score. Similarly, a one-point increase in overall ISIP score was associated with a 0.13-point increase in overall ISIP score for grade 3 students. Patterns of associations were generally similar across both grades.

Table 17
Associations between 2018-19 ISIP scores and Spring 2019 NWEA MAP scores, by grade

ISIP Score	Estimate	Standard error	Model R^2
Grade 2			
Overall ISIP (*n* = 365)	0.334***	0.028	.767
Comprehension ISIP (*n* = 371)	0.243***	0.023	.743
Spelling ISIP (*n* = 369)	0.221***	0.027	.710
Text Fluency ISIP (*n* = 365)	0.128***	0.013	.736
Vocabulary ISIP (*n* = 376)	0.201***	0.024	.712
Grade 3			
Overall ISIP (*n* = 274)	0.212***	0.031	.720
Comprehension ISIP (*n* = 279)	0.163***	0.025	.720
Spelling ISIP (*n* = 278)	0.137***	0.035	.680
Text Fluency ISIP (*n* = 274)	0.082***	0.015	.703
Vocabulary ISIP (*n* = 287)	0.130***	0.022	.709
Grade 4			
Overall ISIP (*n* = 320)	0.014***	0.003	.737
Comprehension ISIP (*n* = 330)	0.015***	0.002	.759
Spelling ISIP (*n* = 348)	0.006*	0.002	.718
Text Fluency ISIP (*n* = 320)	0.045***	0.008	.746
Vocabulary ISIP (*n* = 354)	0.011***	0.002	.728

Note: * p < .05, *** p < .001

As with spring 2018 scores, spring 2019 ISIP scores were significantly positively associated with MAP reading scores. Similar to 2018 scores, spring 2019 overall ISIP scores were associated with the largest increases in MAP reading scores. One-point increases in overall ISIP scores were associated with a 0.33 point increase for grade 2 students, a 0.21 point increase for grade 3 students, and a 0.01 point increase for grade 4 students. It is again important to consider that grade 4 students participated in ISIP AR assessments, which use a much larger and wider range of scores than do the ISIP ER assessments. This helps to explain the much smaller magnitudes of the unstandardized regression estimates for the grade 4 analyses.

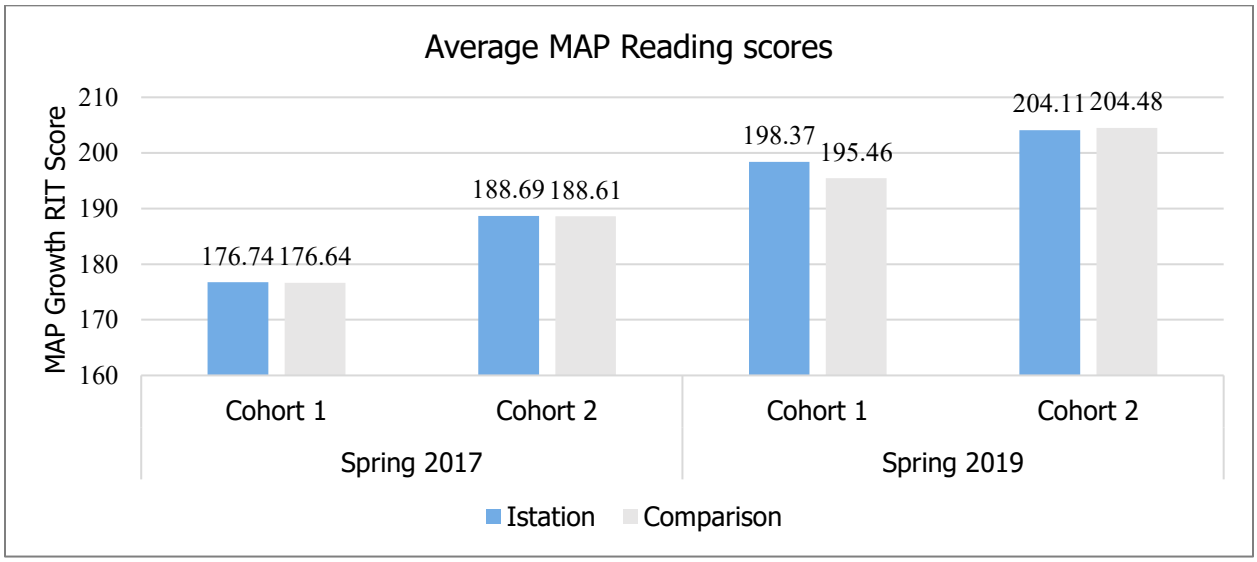
Quasi-experimental study with MAP reading score gains in relation to comparison group

In this section, we describe the results of a quasi-experimental study (QED) employed to compare the growth in student MAP reading test scores from spring 2017 to spring 2019 for Spartanburg students and similar students who did not use Istation or participate in ISIP testing. Since Istation was used in all Spartanburg elementary schools, a comparison group within the district was not readily available. For this reason, we contracted with NWEA to access a "Similar Schools" report that selected a sample of students who are similar to Spartanburg students in

terms of ethnicity, free and reduced lunch status, and prior achievement. Two cohorts of students were examined in these analyses. Specifically, we examined students in grades 1 and 2 in spring 2017, who were then grades 3 and 4 students in spring 2019. In these analyses, spring 2017 grade 1 students will be referred to as Cohort 1, while spring 2017 grade 2 students will be referred to as Cohort 2.

By grade. We first descriptively compare achievement gains by grade across all schools to examine broad patterns of gains relative to comparison students. Figure 1 shows the average MAP reading scores in spring 2017 and spring 2019 for each of the two cohorts examined.

Figure 1\.
Average MAP reading scores, spring 2017 and spring 2019



- Cohort 1 average MAP reading scores in spring 2017 were 176.74 for Istation students and 176.64 for comparison students.
- Cohort 2 average MAP reading scores in spring 2017 were 188.69 for Istation students and 188.61 for comparison students.
- Cohort 1 average MAP reading scores in spring 2019 were 198.37 for Istation students and 195.46 for comparison students.
- Cohort 2 average MAP reading scores in spring 2019 were 204.11 for Istation students and 204.48 for comparison students.

Gains were larger for Cohort 1 Istation students than for comparison students by over 2.5 points. In contrast, gains were very similar for both groups in Cohort 2, with comparison students outgaining Istation students by only approximately one-half of a point. As mentioned earlier, Istation and comparison students were nearly identical at pretest (spring 2017), so differences in posttest scores are indicative of differences in overall gains between Istation and comparison students.

Next, we examine the effects of Istation use on MAP reading growth gains, in relation to comparison students, by conducting matched t-tests on MAP reading gains from spring 2017 to spring 2019. Table 18 shows the estimated effects of Istation on MAP reading gains for all students, as well as by grade. Spartanburg students included in these analyses had non-missing spring 2017 and spring 2019 MAP reading scores, as well as at least one non-missing ISIP score.

Table 18
MAP reading gains relative to comparison students, spring 2017-spring 2019

Cohort	Estimate	Standard Error	p-value
Overall	0.904*	0.382	.018
Cohort 1	2.575***	0.564	<.001
Cohort 2	-0.497	0.57	.328

Note: * p < .05, *** p < .001

Across both cohorts, Istation students averaged nearly a full point more of MAP reading growth from spring 2017 to spring 2019 than did comparison students. This difference was statistically significant, indicating that Istation students averaged significantly larger MAP reading gains than did comparison students. When breaking down by cohort, Istation students in Cohort 1 averaged more than a 2.5-point larger MAP reading gain than did comparison students (p < .001). No significant differences in MAP reading gains were found for Cohort 2. Overall, these results give evidence that Istation use was associated with significantly larger reading achievement gains, especially in Cohort 1.

By school. Next, we used the same analyses as above to compare ELA achievement gains across each of the elementary schools in SCSD-7. As in the previous analyses, we examine average ELA score gains from spring 2017 to spring 2019, relative to comparison students, broken down by school. Table 19 shows the results of these analyses.

Table 19
MAP reading gains relative to comparison students, by school, spring 2017-spring 2019

Cohort	Estimate	Standard Error	p-value
School 1			
Cohort 1	-2.400	1.408	.096
Cohort 2	-3.735**	1.386	.009
School 2			
Cohort 1	-3.000	2.698	0.283
Cohort 2	-5.389*	2.510	.047
School 3			
Cohort 1	5.481***	1.202	<.001
Cohort 2	-0.931	1.307	.479
School 4			
Cohort 1	3.623**	1.172	0.003
Cohort 2	2.377*	0.917	0.012
School 5			
Cohort 1	-1.500	1.372	0.281
Cohort 2	-2.069	1.061	.056

School 6			
Cohort 1	6.986***	0.878	<.001
Cohort 2	2.783**	0.802	.001

Note: * p < .05, ** p < .01, *** p < .001

In relation to the comparison group, ELA achievement gains in schools 4 and 6 were generally most positive, with statistically significant positive Istation effects found in both student cohorts. School 3 was also generally positive, with a statistically significant positive Istation effect with Cohort 1 and no significant differences in achievement in Cohort 2. Schools 1 and 2 generally had the least positive patterns of ELA achievement growth, with negative estimates of the effect of Istation on MAP reading scores. As with the prior analyses, Istation effects were generally more positive for Cohort 1 students than for Cohort 2 students.

Relationship between ISIP usage and ELA score gains

In this section, we examine the relationship between Istation usage and ELA test scores, first by analyzing correlations between usage variables and ELA achievement scores, and then by controlling for previous year test score and demographic variables in regression models, as was done in prior achievement analyses. These models are identical to previous models predicting ELA achievement, with ISIP scores replaced in regression models by Istation usage variables.

Istation usage and MAP reading. We first report simple Pearson correlations between Istation usage variables and NWEA MAP reading scores, by year. Total usage consists of the total Istation usage throughout a given school year, and curriculum usage likewise consists of the total Istation curriculum usage throughout a given school year. These correlations are summarized in Table 20.

Table 20
Correlations between ISIP usage variables and NWEA MAP reading scores

Year	Total Usage (minutes)	Total Sessions	Curriculum Usage (minutes)
Spring 2017	-0.10**	+0.05	-0.05
Spring 2018	+0.11**	+0.15***	-0.04
Spring 2019	+0.14***	+0.13***	+0.13***
Winter 2020	-0.02	-0.01	-0.01

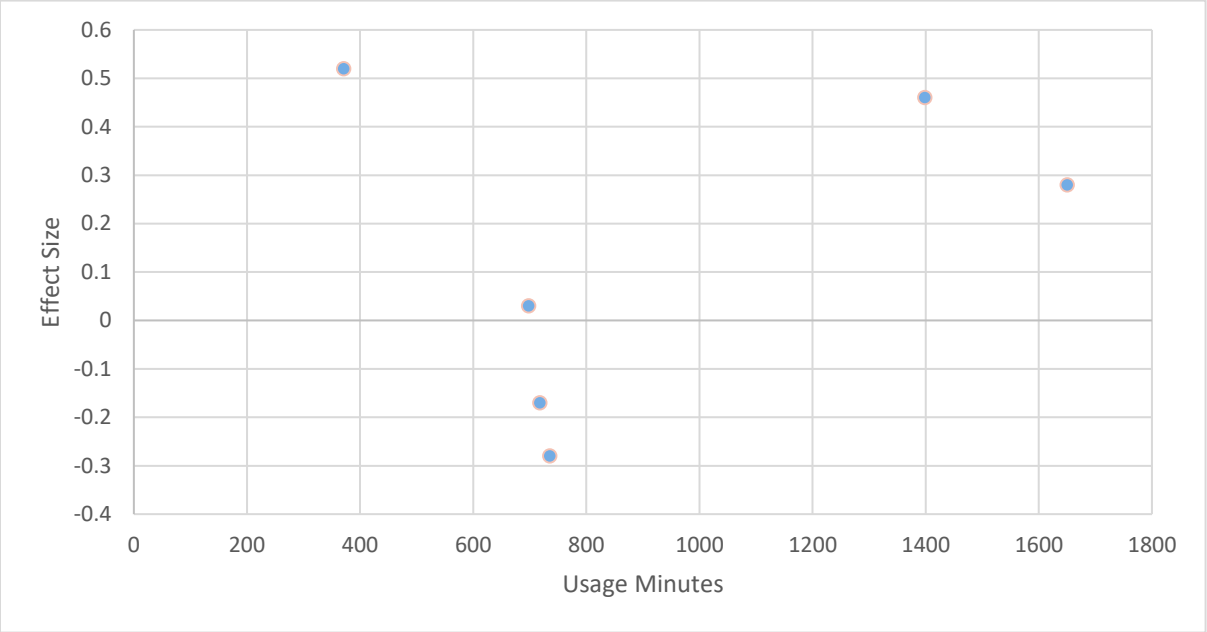
Note: ** p < .01, *** p < .001

The correlations between usage variables and MAP reading scores were generally weak in magnitude, although a number of these correlations did reach statistical significance. Total usage minutes and total Istation sessions tended to be most consistently associated with MAP reading scores, and these associations were the strongest in the 2017-18 and 2018-19 school years. The strongest associations were found in the 2018-19 school year, with all three usage variables significantly positively associated with MAP reading scores. However, it is important to note that none of these correlations were larger than +.20; thus, while some of these associations reached statistical significance, these associations may not be of as much practical

significance. For reference, we include Pearson correlations between usage and MAP reading scores by grade in Appendix D.

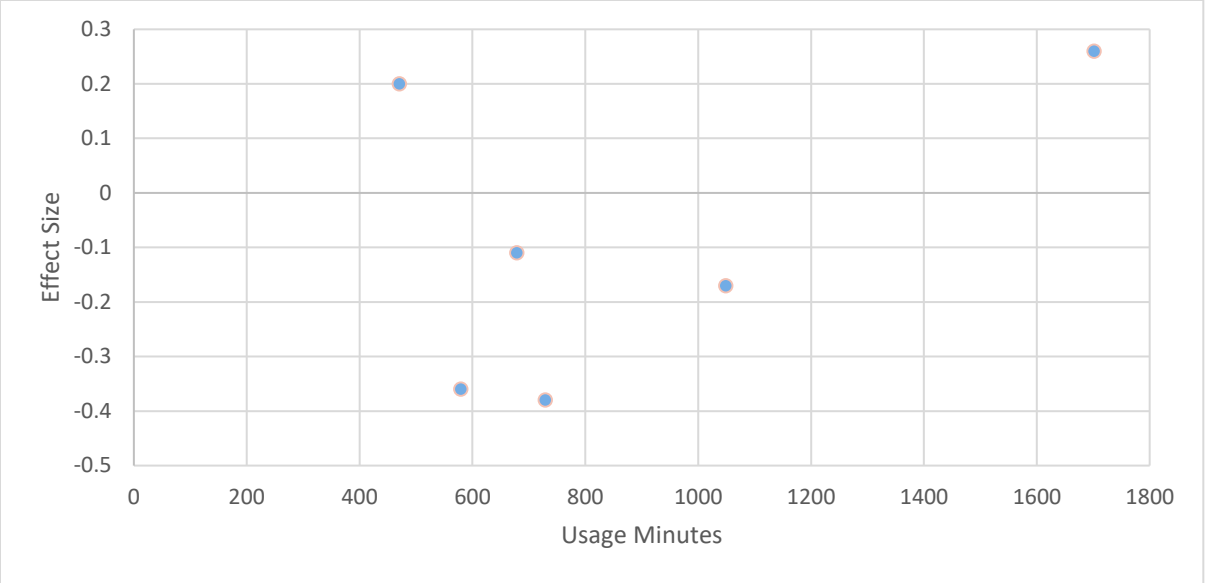
In their Similar School Report, NWEA provided a breakdown of observed versus typical comparison student growth, as measured by effect sizes, by school and grade level. This allowed us to examine the relationship between Istation impacts on student MAP reading growth, relative to comparison students, and average minutes of Istation usage, by school. Figures 2 and 3 display these relationships, by cohort.

Figure 2
Relationship between MAP reading growth effect size and Istation usage, by school (cohort 1)



- One school with about 350 minutes of average Istation usage showed a MAP reading growth effect size of slightly greater than positive 0.50.
- Three schools average approximately 700 minutes of Istation usage. MAP reading growth effect sizes for these three schools ranged from -0.30 to +0.05.
- One school averaged 1400 minutes of Istation usage, and the MAP reading growth effect size was approximately +0.45.
- One school average over 1600 minutes of Istation usage, with a MAP reading growth effect size of slightly less than +0.30.

Figure 3
Relationship between MAP reading growth effect size and Istation usage, by school (cohort 2)



- One school with about 500 minutes of average Istation usage had a MAP reading growth effect size of + 0.2.
- One school with average Istation usage of just under 600 minutes had a MAP reading growth effect size of about -0.35.
- One school with just under 700 minutes of average Istation usage had a MAP reading growth effect size of just less than -0.1, while another school with about 750 minutes of average Istation usage had a MAP reading growth effect size of about -0.40.
- One school with just over 1000 minutes of average Istation usage had a MAP reading growth effect size of slightly more than -0.2.
- One school with about 1700 minutes of average Istation usage had a MAP reading growth effect size of just less than +0.3.

With the exception of the same school in each cohort, a generally positive relationship between average minutes of Istation usage and MAP reading gains is shown in Figures 2 and 3. The one school that had the lowest amounts of average Istation usage in both cohorts used Istation at a level that suggests Diagnostic usage only, with no Instructional usage. Since this school was one of the top two achieving schools in each cohort, it is possible this school was choosing not to use Istation Instruction, as these students were already high achieving and did not require additional intervention. Since the Istation curriculum is used more frequently as an intervention tool with students in Tier 3 and Tier 2, this result is not surprising. For the remaining schools as a general trend, increased levels of Istation Instructional usage are associated with greater MAP reading gains. Further, schools that met recommended Istation guidelines of at least 30 minutes of Istation usage per week consistently demonstrated greater MAP reading gains than did comparison students. This finding was consistent across both cohorts.

We also examined Pearson correlations between Istation usage variables and SC READY ELA scores. We report correlations by year and, in the 2018-19 school year, by grade, in Table 21.

Table 21
Correlations between ISIP usage variables and SC READY ELA scores

Year	Total Usage (minutes)	Total Sessions	Curriculum Usage (minutes)
Spring 2018	-0.01	-0.04	-0.07
Spring 2019			
Grade 3	0.15**	0.14**	0.17***
Grade 4	0.38***	0.30***	0.37***

Note: ** p < .01, *** p < .001

No significant associations were found between 2017-18 Istation usage and spring 2018 SC READY ELA scores. Weak to moderate positive correlations were found between 2018-19 Istation usage and spring 2019 SC READY ELA scores. Correlations between usage variables and SC READY ELA scores for grade 4 students ranged from +.30 to +.38, indicating weak to moderate associations between usage and ELA achievement. For grade 3, the associations were generally weak, though still statistically significant, with correlations ranging from +.14 to +.17. One important factor to consider is that grade 4 students in 2019 were using the ISIP AR assessments, while grade 3 students were using the ISIP ER assessments. ISIP AR usage, therefore, appeared to be more strongly associated with SC READY scores than was ISIP ER usage. Associations were very similar between usage and SC READY scores when considering both total Istation usage and curriculum usage only. These results are consistent with heavier Istation usage with Tier 2 and Tier 3 students, and thus the relationship is not always linear between assessment scores and usage.

To further examine the association between ISIP usage and ELA achievement, we broke total usage down into quartiles: low, mid, mid-high, and high. This allowed for an analysis of the association between levels of usage and ELA achievement. It is plausible that usage may be positively associated with achievement up to a certain optimal point, after which gains may be less, as typically students of lower ability are represented in high usage cases. In all analyses, low Istation usage is used as the reference group, and the regression estimates associated with each usage level can be interpreted as the average achievement score gain, relative to the low-usage group.

Table 22 presents the associations between usage quartiles and spring MAP reading scores over each school year. The model for 2016-17 did not include a prior achievement control, as we did not have available data from the 2015-16 school year, but all subsequent models include prior year MAP reading scores as a prior achievement control. We also include demographic variables and dummy variables for grade and school, consistent with prior analyses.

Table 22
Associations between ISIP usage quartiles and spring MAP reading score, by year

Spring 2017 ISIP Usage	Estimate	Standard error
Mid	3.421*	1.360
Mid-high	2.882*	1.371
High	1.395	1.386
N	729	
Model R^2	.434	
Spring 2018 ISIP Usage	Estimate	Standard error
Mid	-0.060	0.953
Mid-high	-0.399	0.956
High	0.169	1.010
N	656	
Model R^2	.736	
Spring 2019 ISIP Usage	Estimate	Standard error
Mid	0.543	0.738
Mid-high	2.605**	0.816
High	3.879***	0.877
N	1139	
Model R^2	.735	
Winter 2020 ISIP Usage	Estimate	Standard error
Mid	-0.279	0.645
Mid-high	-0.385	0.696
High	0.309	0.733
N	1432	
Model R^2	.788	

Note: * p < .05, ** p < .01, *** p < .001

Associations between usage quartiles and MAP achievement varied across years. In the 2016-17 school year, second and third quartile usage was associated with significantly higher MAP reading scores, in relation to first-quartile usage. Specifically, second-quartile usage was associated with a nearly 3.5-point increase in MAP reading score, and third-quartile usage was associated with a nearly 3-point increase in MAP reading score, relative to first-quartile usage students. In 2018-19, third and fourth-quartile usage was associated with significantly higher MAP reading scores, relative to first-quartile usage. Third-quartile usage was associated with a nearly 3-point increase in MAP reading score, while fourth-quartile usage was associated with a nearly 4-point increase in MAP reading score. No significant associations between usage and MAP reading scores were observed in the 2017-18 or 2019-20 school years.

We also examined associations between Istation usage and next-year MAP reading score. Thus, we used prior year Istation usage to predict spring 2018, spring 2019, and winter 2020 MAP reading scores. No significant associations were found between prior-year Istation usage and MAP reading score.

Istation usage and SC READY. In these analyses, we use the same usage quartiles constructed in the previous analyses to examine associations between Istation usage and SC READY scores. For analyses examining spring 2018 SC READY scores, spring 2017 MAP

reading scores are used as the prior achievement control, while for analyses examining spring 2019 SC READY scores, spring 2018 SC READY scores were used as the prior achievement control. We also included the same demographic, grade, and school variables as were used in prior analyses. Table 23 shows the results of these analyses.

Table 23
Associations between ISIP usage quartiles and SC READY ELA score, by year

Spring 2018 ISIP Usage	Estimate	Standard error
Mid	5.732	8.975
Mid-high	16.136^	8.512
High	23.913*	9.878
N	345	
Model R^2	.724	
Spring 2019 ISIP Usage	Estimate	Standard error
Mid	6.046	9.671
Mid-high	4.970	10.573
High	10.058	13.222
N	404	
Model R^2	.705	

Note: ^ $p < .10$, * $p < .05$

Istation usage quartiles were significantly associated with 2018 SC READY scores, but not 2019 SC READY scores. Fourth-quartile (high) usage in 2017-18 was significantly positively associated with SC READY ELA scores, with students scoring nearly 24 points higher, on average, in relation to students with first-quartile usage. Third-quartile (mid-high) usage approached statistical significance ($p = .059$), with students scoring approximately 16 points higher on average than students with first-quartile usage. By contrast, none of the associations between usage quartiles and SC READY scores were statistically significant in 2019.

We also conducted analyses examining the association between Istation usage and next-year SC READY scores, as we did with MAP reading scores. Since we obtained SC READY data from 2018 and 2019, we conducted an analysis of the association between 2017-18 Istation usage and spring 2019 SC READY ELA scores, controlling for 2018 SC READY scores and using the same demographic, grade, and school variables as in previous models. As with similar MAP reading analyses, no significant associations between 2017-18 Istation usage quartiles and 2019 SC READY ELA scores were found.

Curriculum usage and MAP Reading scores. Istation provides a further breakdown of usage minutes; specifically, they also measure the amount of time a student spends working only on the Istation curriculum. Thus, we provide information regarding the associations between minutes of curriculum usage and MAP reading scores. These analyses contain the same controls for prior achievement, demographic variables, school, and grade that were used in prior analyses.

A significant positive association was found for high usage in the 2018-19 school year; this quartile of curriculum usage was associated with slightly more than a 3-point increase in

MAP reading scores, relative to first-quartile usage. The association in the 2017-18 school year was not significant. Associations between curriculum usage and MAP reading generally followed patterns similar to the associations between overall usage and MAP reading, but simply did not achieve statistical significance as often. Full tables of results from all years may be found in Appendix D.

Curriculum usage and SC READY ELA scores. As with overall Istation usage, we also examined the association between minutes of curriculum usage and SC READY scores. We used models similar to those used for examining the associations between curriculum usage and MAP reading scores, including similar prior achievement, demographic, grade, and school variables in all regression models. Results of these analyses can be found in Table 24.

Table 24
Associations between Istation curriculum usage quartiles and SC READY ELA score, by year

Spring 2018 ISIP Usage	Estimate	Standard error
Mid	14.073	9.185
Mid-high	20.498*	8.936
High	33.435**	10.154
N	345	
Model R^2	.727	
Spring 2019 ISIP Usage	Estimate	Standard error
Mid	2.407	13.012
Mid-high	2.137	13.341
High	14.923	15.122
N	404	
Model R^2	.706	

Note: * $p < .05$, ** $p < .01$

Significant positive associations between third and fourth-quartile usage and SC READY ELA scores were found in the 2017-18 school year, while no significant associations were found in the 2018-19 school year. Quartiles 3 and 4 of curriculum usage were associated with gains of 20.5 and 33.4 points on SC READY ELA, respectively, in relation to quartile 1 usage in 2017-18. Patterns of associations between curriculum usage and SC READY scores were similar to those found between overall usage and SC READY scores. Even though the high quartile of usage was not significantly associated with spring 2019 SC READY scores, the patterns were still similar to those found in spring 2018. This gives evidence suggesting that the highest quartile of Istation curriculum usage was consistently positively related with increased SC READY ELA scores.

Istation sessions and MAP Reading scores. We also examined the association between other Istation usage metrics, specifically total number of Istation sessions completed, and achievement. We begin by presenting the associations between total Istation sessions and MAP reading scores, by year. As with previous analyses, we included controls for prior achievement (except in 2016-17, the first year of available data), demographics, school, and grade in each regression model. Table 25 shows the associations between total Istation sessions and MAP

reading scores, after controlling for prior achievement and demographics, in each of the 2016-17 through 2019-20 school years.

Table 25
Associations between total Istation sessions and MAP reading scores, by year

Year	Estimate	Standard error	Model R^2
2016-17 (*n* = 729)	0.038*	0.018	.433
2017-18 (*n* = 656)	0.015	0.010	.738
2018-19 (*n* = 1139)	0.032***	0.009	.733
2019-20 (*n* = 1432)	0.004	0.011	.788

Note: * p < .05, *** p < .001

The number of total Istation sessions was significantly positively associated with MAP reading scores in the 2016-17 and 2018-19 school years. The association found in 2018-19 is especially notable, as this analysis included a control for prior achievement in the form of spring 2018 MAP reading score. The regression estimates make more sense when considering the average number of Istation sessions completed each year. Average usage generally ranged from 40-50 sessions; thus, completion of 50 Istation sessions was associated with a 1.9-point increase in 2016-17 MAP reading score and a 1.6-point increase in 2018-19 MAP reading score. The associations between completed Istation sessions and MAP reading scores was not significant in the 2017-18 or 2019-20 school years. Notably, significant positive associations between Istation sessions and MAP reading scores occurred in the same years in which significant positive associations were also observed between total Istation usage and MAP reading scores.

Istation sessions and SC READY scores. We also examined the associations between completed Istation sessions and SC READY ELA achievement. We analyzed this association by year, using models similar to those used in MAP reading analyses. Spring 2017-18 MAP reading score was used as a prior achievement control for spring 2018 SC READY score, and 2018 SC READY score was used as a prior achievement control for spring 2019 SC READY score. We present the results of these analyses, by year, in Table 26.

Table 26
Associations between total Istation sessions and SC READY ELA scores, by year

Year	Estimate	Standard error	Model R^2
2017-18 (*n* = 345)	0.261**	0.089	.727
2018-19 (*n* = 404)	-0.118	0.164	.706

Note: ** p < .01

The association between completed Istation sessions and SC READY ELA scores was significantly positive in 2017-18, but not in 2018-19. As with the previous analyses, the regression estimates are best interpreted in terms of average number of completed Istation sessions. Thus, in 2017-18, completion of 50 Istation sessions is associated with an approximately 13-point increase in SC READY ELA score, and 2017-18 was the same school year in which total Istation usage was observed to be significantly positively related to SC READY ELA scores.

Summary and Discussion

The purpose of this evaluation was to examine the association between ISIP scores and usage and student achievement and growth on ELA standardized test measures, as well as to compare MAP Reading assessment growth of SCSD-7 Istation students in relation to that of otherwise similar students who did not use Istation. This report includes findings from student usage and achievement data on ISIP ER and AR assessments, as well as on the SC READY ELA state assessment and NWEA MAP reading assessment

Results showed that Istation students significantly outgained virtual comparison students, with this pattern especially pronounced for the younger cohort of students. SCSD-7 students were matched with virtual comparison students on the basis of prior reading achievement and demographic variables, with a sufficiently large sample size. Thus, this study supports the conclusion that Istation usage is related to larger reading achievement gains, in relation to non-Istation users. Further, the results of this study meet the criteria for meeting WWC Standards with Reservations, as well as those for "Moderate" evidence of the efficacy of Istation in improving student reading performance per the Every Student Succeeds Act (ESSA).

Student Istation usage remained fairly consistent across each of the four school years analyzed in this report. Students tended to average between 14-17 hours of total usage each year. Usage was reported as two different measures: total usage and curriculum usage. This allowed for analysis of time students spent working on the Istation curriculum, in addition to total Istation time. Curriculum usage was also relatively steady across years, with students averaging about 13-14 hours of curriculum usage each year. Usage statistics declined markedly in the 2019-20 school year; however, this decline is almost certainly attributable to the disruption in the school year caused by the Covid-19 pandemic.

Descriptive analysis of learning gains within school years (fall to spring, except in 2019-20, which was fall to winter) showed evidence of meaningful learning gains throughout each year. ISIP ER and AR gains were relatively steady across time, though they tended to be largest in the 2016-17 and 2019-20 school years. ISIP score gains were largest for grades K-1 students and tended to become smaller for students in later grades. This pattern is consistent with both national ISIP ER norms and findings from previous evaluations of ISIP assessments. Similarly, descriptive analysis of learning gains on SC READY ELA and MAP reading scores showed that SCSD-7 students showed patterns of gains that were comparable to state and national norms.

When examining the association between ISIP scores and ELA scores, significant strong, positive associations were consistently found. Observed Pearson correlations between ISIP (ER and AR) scores and both SC READY ELA and MAP reading scores generally exceeded +.70, giving evidence of strong predictive validity of ISIP scores for both assessments. These correlations were consistently found across both year and grade level. Moderate to strong correlations were also consistently found when using previous-year ISIP scores to predict next-year achievement (i.e., 2017-18 ISIP predicting 2018-19 MAP reading). In subsequent regression analyses that controlled for demographic variables, school, and grade, overall and sub-domain ISIP scores remained statistically significant predictors of both SC READY ELA and MAP

reading scores. These results indicate that ISIP ER and AR scores may be used as effective proxies for achievement measures such as SC READY and formative measures such as MAP.

A comparison of MAP reading scores between Spartanburg students and a sample of similar students provided by NWEA, who did not use Istation, yielded varied, but generally positive, patterns of results. Schools that met Istation's recommended usage guidelines for instruction consistently outperformed comparison students in terms of MAP ELA growth. This effect was consistent across both student cohorts. Overall, students who used Istation averaged a statistically significant nearly one-point advantage in MAP spring 2017 to spring 2019 reading score gain over comparison students. Of the two cohorts of students available for analysis, the first cohort showed a significantly greater MAP reading gain of 2.5 points relative to comparison students.

Similar correlational analyses with ISIP usage variables showed varied patterns of results. When considered as a continuous variable, total ISIP usage was generally weakly, but significantly, positively correlated with MAP reading scores and SC READY ELA scores, although these associations were inconsistent in terms of significance and across analyses. These same patterns of correlations were found when examining associations between curriculum usage and ELA achievement measures, as well. Subsequent analyses using dummy variables for quartiles of Istation usage, along with controlling for prior ELA achievement, demographic, school, and grade variables, yielded patterns of results that varied by year and outcome assessment. However, many significant positive associations were found, particularly for the quartiles of the highest Istation usage. Similar patterns were found when analyzing the association between Istation usage and SC READY ELA scores.

Limitations

Some important limitations of this evaluation should be noted. First, this study was conducted in an entire district that had implemented the Istation curriculum and Istation ER and AR assessment packages. Therefore, no comparison schools were available within the district for evaluating program efficacy. The use of a Similar Schools Report, however, did allow for a comparison of MAP reading gains between SCSD-7 students and those from otherwise similar non-Istation students. Since the analyses from this evaluation examined data from only one district, generalization of the results is restricted relative to a study involving multiple districts. Additional research is encouraged to examine the patterns of results found in this study using multiple districts.

Conclusions

The key results and conclusions of this evaluation are as follows:

- ISIP ER and AR scores were strong predictors of NWEA MAP reading scores and SC READY ELA scores, with observation correlations generally above +.70.
- The predictive validity of ISIP scores remained high, even after controlling for prior achievement and demographic variables.

- Spartanburg Istation students significantly outgained comparison students on the MAP reading assessment from spring 2017 to spring 2019. This advantage was most apparent in the first (younger) cohort of students, and meets standards for WWC ESSA Tier 2 evidence.
- Students in schools that met recommended Istation guidelines generally experienced larger MAP reading gains than did otherwise similar comparison students.
- Associations between total ISIP usage and ELA achievement varied across years and test. Significant positive associations between total Istation usage and MAP reading scores were found in the 2016-17 and 2018-19 school years. Significant positive associations between total Istation usage and SC READY ELA scores were found in the 2017-18 school year. These associations held with other usage variables, including curriculum usage and number of sessions.
- ISIP ER and AR within-year scoring gains were generally comparable to national norms
- The results of the present analyses give evidence for the potential use of ISIP ER and AR assessment scores as meaningful predictors of both state standardized test performance and MAP reading test performance.

References

Mathes, P., Torgesen, J., & Herron, J. (2016). Istation's Indicators of Progress (ISIP) Early Reading Technical Report: Computer Adaptive Testing System for Continuous Progress Monitoring of Reading Growth for Students Pre-K through Grade 3.

Appendix A: Demographics by School

Table 1
Student demographics by school

Group	
Cleveland Academy of Leadership	
% Black	80.37
% White	2.96
% Hispanic	9.26
% Other Race	7.04
% Economically disadvantaged	95.19
% Students with Disabilities/SPED	14.44
% ELs	8.52
N	270
Drayton Elementary School	
% Black	64.60
% White	21.12
% Hispanic	6.83
% Other Race	7.45
% Economically disadvantaged	87.58
% Students with Disabilities/SPED	14.91
% ELs	7.45
N	161
Jesse Boyd Elementary School	
% Black	64.60
% White	21.12
% Hispanic	6.83
% Other Race	7.45
% Economically disadvantaged	87.58
% Students with Disabilities/SPED	14.91
% ELs	7.45
N	264
Mary Wright Elementary School	
% Black	85.81
% White	6.92
% Hispanic	4.84
% Other Race	2.42
% Economically disadvantaged	97.23
% Students with Disabilities/SPED	14.19
% ELs	3.11
N	289
Pine Street Elementary School	
% Black	23.65
% White	67.07
% Hispanic	2.99
% Other Race	6.29
% Economically disadvantaged	38.62
% Students with Disabilities/SPED	9.58
% ELs	3.89

Group	
N	334
E.P. Todd Elementary School	
% Black	61.97
% White	20.08
% Hispanic	5.02
% Other Race	12.93
% Economically disadvantaged	82.63
% Students with Disabilities/SPED	10.23
% ELs	8.49
N	518

Appendix B: Usage Tables

Table 2

Istation usage amounts for students, by school year

	Mean	Standard Deviation	Minimum	Maximum
2016-17 (*n* = 3088)				
Total minutes of usage	870.06	689.67	0.23	4962.92
Curriculum usage minutes	703.69	640.35	0.23	4802.80
Number of sessions completed	32.32	25.76	1	187
2017-18 (*n* = 2522)				
Total minutes of usage	833.66	733.75	9.67	4851.62
Curriculum usage minutes	754.63	795.45	0.02	4891.30
Number of sessions completed	40.37	31.93	1	180
2018-19 (*n* = 2994)				
Total minutes of usage	907.83	681.11	7.03	4743.85
Curriculum usage minutes	752.31	678.41	0.33	4864.83
Number of sessions completed	46.62	32.91	1	214
2019-20 (*n* = 2557)				
Total minutes of usage	731.84	524.04	0	3872.97
Curriculum usage minutes	598.45	514.79	0	4988.05
Number of sessions completed	37.60	24.63	1	0

Table 3

Istation usage amounts for students in 2016-17, by grade

	Mean	Standard Deviation	Minimum	Maximum
Grade K (*n* = 517)				
Total minutes of usage	830.09	851.38	2.55	10289.72
Curriculum usage minutes	710.67	1150.39	4.88	20553.47
Number of sessions completed	30.16	21.99	1	130
Grade 1 (*n* = 489)				
Total minutes of usage	1158.70	1424.86	19.88	11618.78
Curriculum usage minutes	895.16	1121.41	3.95	9092.05
Number of sessions completed	36.72	25.39	1	175
Grade 2 (*n* = 602)				
Total minutes of usage	1154.11	1637.99	0.58	21550.50
Curriculum usage minutes	995.58	1540.25	1.58	21333.00
Number of sessions completed	43.27	33.28	1	190
Grade 3 (*n* = 553)				
Total minutes of usage	1029.49	1094.63	0.23	12389.15
Curriculum usage minutes	1090.17	1865.75	0.23	26376.75
Number of sessions completed	44.30	27.58	1	187
Grade 4 (*n* = 544)				
Total minutes of usage	981.06	1807.06	6.03	23998.65

	Mean	Standard Deviation	Minimum	Maximum
Curriculum usage minutes	844.28	1618.15	1.33	20617.18
Number of sessions completed	35.66	20.35	1	100
Grade 5 (*n* = 474)				
Total minutes of usage	1408.69	4551.77	1.42	54164.05
Curriculum usage minutes	1177.77	3670.33	0.52	53953.20
Number of sessions completed	32.80	20.88	1	106

Table 4
Istation usage amounts for students in 2017-18, by grade

	Mean	Standard Deviation	Minimum	Maximum
Grade K (*n* = 461)				
Total minutes of usage	1058.85	882.13	30.53	4874.67
Curriculum usage minutes	884.17	987.51	1.45	9604.72
Number of sessions completed	44.04	34.39	1	156
Grade 1 (*n* = 439)				
Total minutes of usage	707.41	708.95	3.98	3975.07
Curriculum usage minutes	874.62	1887.16	0.17	32041.57
Number of sessions completed	34.11	33.41	1	180
Grade 2 (*n* = 436)				
Total minutes of usage	1036.57	979.81	5.47	4581.62
Curriculum usage minutes	1454.82	3150.52	0.05	34583.28
Number of sessions completed	45.50	34.65	1	151
Grade 3 (*n* = 482)				
Total minutes of usage	866.42	585.24	8.52	5249.82
Curriculum usage minutes	879.32	944.77	0.37	10830.85
Number of sessions completed	50.50	34.75	1	261
Grade 4 (*n* = 401)				
Total minutes of usage	669.44	490.30	11.22	2063.40
Curriculum usage minutes	720.09	1695.68	0.65	32354.38
Number of sessions completed	35.33	23.18	1	110
Grade 5 (*n* = 385)				
Total minutes of usage	547.34	508.74	2.62	3624.85
Curriculum usage minutes	554.22	666.59	0.10	4891.30
Number of sessions completed	26.41	23.67	1	157

Table 5
Istation usage amounts for students in 2018-19, by grade

	Mean	Standard Deviation	Minimum	Maximum
Grade K (*n* = 475)				
Total minutes of usage	914.03	689.90	13.87	4030.80
Curriculum usage minutes	800.41	746.06	1.93	5736.60
Number of sessions completed	41.41	29.77	2	126

	Mean	Standard Deviation	Minimum	Maximum
Grade 1 (*n* = 528)				
Total minutes of usage	931.33	705.56	0.05	3613.17
Curriculum usage minutes	806.97	762.94	1.25	6560.27
Number of sessions completed	50.34	40.05	1	200
Grade 2 (*n* = 541)				
Total minutes of usage	1076.24	879.54	23.75	5066.18
Curriculum usage minutes	932.52	842.23	7.12	4842.28
Number of sessions completed	50.26	32.14	1	167
Grade 3 (*n* = 439)				
Total minutes of usage	945.41	664.22	5.48	4497.82
Curriculum usage minutes	828.02	641.84	3.53	4376.40
Number of sessions completed	56.09	38.35	1	214
Grade 4 (*n* = 545)				
Total minutes of usage	909.19	611.62	21.22	4061.13
Curriculum usage minutes	706.64	580.61	0.38	3666.53
Number of sessions completed	47.12	28.86	2	174
Grade 5 (*n* = 483)				
Total minutes of usage	625.64	399.62	7.03	2524.50
Curriculum usage minutes	459.53	411.06	0.33	4663.72
Number of sessions completed	32.79	20.79	1	136

Table 6

Istation usage amounts for students in 2019-20, by grade

	Mean	Standard Deviation	Minimum	Maximum
Grade K (*n* = 449)				
Total minutes of usage	857.80	538.00	29.35	3872.97
Curriculum usage minutes	720.01	514.64	2.48	3731.10
Number of sessions completed	39.49	24.94	1	130
Grade 1 (*n* = 447)				
Total minutes of usage	878.26	561.71	0.15	3625.90
Curriculum usage minutes	736.95	596.95	0.63	4988.05
Number of sessions completed	44.70	27.72	1	144
Grade 2 (*n* = 448)				
Total minutes of usage	661.58	393.17	13.72	2481.37
Curriculum usage minutes	549.62	385.25	4.25	2364.83
Number of sessions completed	33.70	18.28	1	121
Grade 3 (*n* = 460)				
Total minutes of usage	668.50	589.51	0	3159.20
Curriculum usage minutes	582.71	572.23	0	3055.45
Number of sessions completed	34.97	26.46	1	129
Grade 4 (*n* = 337)				
Total minutes of usage	800.32	514.85	0.17	2881.05
Curriculum usage minutes	631.54	488.89	0.17	2798.12

	Mean	Standard Deviation	Minimum	Maximum
Number of sessions completed	43.16	25.57	1	136
Grade 5 (*n* = 422)				
Total minutes of usage	513.75	429.07	9.70	3029.77
Curriculum usage minutes	372.27	400.49	0.27	2885.73
Number of sessions completed	29.83	20.87	1	117

Table 7
Istation usage amounts for students in 2016-17, by school

	Mean	Standard Deviation	Minimum	Maximum
School 1 (n = 112)				
Total minutes of usage	1001.27	711.73	101.55	3546.27
Curriculum usage minutes	833.48	692.91	47.65	3372.32
Number of sessions completed	36.72	22.55	5	115
School 2 (n = 84)				
Total minutes of usage	1147.37	691.78	94.58	3166.67
Curriculum usage minutes	960.61	687.30	37.30	2981.28
Number of sessions completed	61.67	41.89	3	175
School 3 (n = 120)				
Total minutes of usage	748.80	725.71	41.42	4149.80
Curriculum usage minutes	542.06	572.76	4.15	3168.70
Number of sessions completed	27.58	20.82	3	95
School 4 (n = 126)				
Total minutes of usage	1264.92	888.57	138.63	3440.55
Curriculum usage minutes	1102.47	854.57	76.32	3232.78
Number of sessions completed	54.11	36.17	9	162
School 5 (n = 101)				
Total minutes of usage	1166.12	750.52	140.85	3709.80
Curriculum usage minutes	981.96	716.58	40.57	3606.02
Number of sessions completed	49.85	29.51	8	131
School 6 (n = 163)				
Total minutes of usage	757.88	297.32	128.30	2448.07
Curriculum usage minutes	610.00	283.72	42.20	2238.08
Number of sessions completed	31.44	13.72	5	107

Table 8
Istation usage amounts for students in 2017-18, by school

	Mean	Standard Deviation	Minimum	Maximum
School 1 (n = 171)				
Total minutes of usage	1280.98	967.84	31.73	4581.62
Curriculum usage minutes	1259.60	1113.64	0.02	4472.25
Number of sessions completed	55.15	33.76	1	132
School 2 (n = 122)				

	Mean	Standard Deviation	Minimum	Maximum
Total minutes of usage	677.93	649.61	34.33	4183.33
Curriculum usage minutes	679.78	789.49	1.35	4472.43
Number of sessions completed	37.43	29.78	1	132
School 3 (n = 146)				
Total minutes of usage	777.19	640.27	9.67	2703.98
Curriculum usage minutes	735.20	713.00	0.05	3715.22
Number of sessions completed	48.96	43.04	1	169
School 4 (n = 197)				
Total minutes of usage	1400.80	851.26	46.47	3975.07
Curriculum usage minutes	1280.41	832.80	16.47	3765.42
Number of sessions completed	68.76	37.81	5	180
School 5 (n = 170)				
Total minutes of usage	599.07	548.62	27.45	4147.22
Curriculum usage minutes	557.49	708.47	0.55	4739.05
Number of sessions completed	32.87	23.30	1	113
School 6 (n = 221)				
Total minutes of usage	650.03	474.92	24.17	4328.93
Curriculum usage minutes	548.59	494.13	0.37	4169.25
Number of sessions completed	30.90	20.14	4	131

Table 9
Istation usage amounts for students in 2018-19, by school

	Mean	Standard Deviation	Minimum	Maximum
School 1 (n = 272)				
Total minutes of usage	1148.50	903.85	21.22	4743.85
Curriculum usage minutes	972.68	859.66	3.37	4471.02
Number of sessions completed	50.42	29.80	2	159
School 2 (n = 400)				
Total minutes of usage	614.12	419.25	2.90	3810.98
Curriculum usage minutes	472.30	446.70	0.72	3483.70
Number of sessions completed	32.83	19.26	2	146
School 3 (n = 285)				
Total minutes of usage	941.60	556.07	7.88	2967.95
Curriculum usage minutes	775.17	551.19	6.20	2882.45
Number of sessions completed	53.12	35.47	1	171
School 4 (n = 294)				
Total minutes of usage	1711.61	731.76	41.60	4061.13
Curriculum usage minutes	1534.95	717.94	12.17	3887.23
Number of sessions completed	87.78	39.01	4	200
School 5 (n = 291)				
Total minutes of usage	949.54	474.59	29.60	4058.33
Curriculum usage minutes	782.40	468.59	0.38	3763.28
Number of sessions completed	55.97	24.22	1	117

	Mean	Standard Deviation	Minimum	Maximum
School 6 (n = 224)				
Total minutes of usage	507.08	368.70	19.95	2086.83
Curriculum usage minutes	405.30	389.13	1.25	1939.58
Number of sessions completed	28.37	23.37	2	140

Table 10

Istation usage amounts for students in 2019-20, by school

	Mean	Standard Deviation	Minimum	Maximum
School 1 (n = 273)				
Total minutes of usage	410.99	302.51	21.90	1576.75
Curriculum usage minutes	303.70	274.55	0.27	1460.83
Number of sessions completed	23.32	16.80	1	66
School 2 (n = 401)				
Total minutes of usage	735.70	372.47	131.92	3029.77
Curriculum usage minutes	571.61	384.70	37.85	2885.73
Number of sessions completed	41.84	18.70	10	117
School 3 (n = 287)				
Total minutes of usage	606.61	510.25	4.52	2881.05
Curriculum usage minutes	479.73	490.11	1.25	2798.12
Number of sessions completed	32.32	24.29	1	136
School 4 (n = 293)				
Total minutes of usage	1029.39	570.92	2.77	2607.05
Curriculum usage minutes	883.48	569.05	0.60	2499.12
Number of sessions completed	51.22	25.08	2	129
School 5 (n = 13)				
Total minutes of usage	1019.64	1091.93	15.33	2863.03
Curriculum usage minutes	895.23	1051.96	10	2696.20
Number of sessions completed	35.00	33.06	2	86
School 6 (n = 195)				
Total minutes of usage	431.92	363.96	0.58	2401.23
Curriculum usage minutes	350.63	332.54	0.58	2317.72
Number of sessions completed	23.81	19.26	1	121

Appendix C: Descriptive Achievement Tables

Table 11

Average ISIP performance, 2016-17, by grade

ISIP Subdomain Name	Mean Fall 2016	Mean Spring 2017	Mean change
K grade (*n* = 400)			
Overall	179.33	195.52	16.19
Comprehension	n/a	n/a	n/a
Spelling	n/a	n/a	n/a
Text Fluency	n/a	n/a	n/a
Vocabulary	182.89	198.32	15.43
1st grade (*n* = 443)			
Overall	200.74	215.79	15.05
Comprehension	202.06	219.97	17.91
Spelling	203.88	218.29	14.41
Text Fluency	28.07	38.68	10.61
Vocabulary	201.80	215.66	13.86
2nd grade (*n* = 566)			
Overall	221.87	232.22	10.35
Comprehension	225.73	237.13	11.40
Spelling	221.79	231.61	9.82
Text Fluency	24.88	45.25	20.37
Vocabulary	219.73	235.21	15.48

Table 12

Average ISIP performance, 2017-18, by grade

ISIP Subdomain Name	Mean Fall 2016	Mean Spring 2017	Mean change
K grade (*n* = 443)			
Overall	181.64	193.89	12.25
Comprehension	n/a	n/a	n/a
Spelling	n/a	n/a	n/a
Text Fluency	n/a	n/a	n/a
Vocabulary	180.96	196.19	15.23
1st grade (*n* = 409)			
Overall	202.38	216.03	13.65
Comprehension	202.72	220.29	17.57
Spelling	204.98	218.34	13.36
Text Fluency	23.92	30.78	6.86
Vocabulary	203.68	215.69	12.01
2nd grade (*n* = 458)			
Overall	223.72	231.92	8.20
Comprehension	227.16	235.87	8.71
Spelling	222.17	231.51	9.34
Text Fluency	29.29	44.31	15.02
Vocabulary	224.25	235.18	10.93

ISIP Subdomain Name	Mean Fall 2016	Mean Spring 2017	Mean change
3rd grade (*n* = 514)			
Overall	234.87	240.42	5.55
Comprehension	236.65	242.89	6.24
Spelling	233.72	241.49	7.77
Text Fluency	54.60	62.25	7.65
Vocabulary	236.64	245.28	8.64

Table 13
Average ISIP performance, 2018-19, by grade

ISIP Subdomain Name	Mean Fall 2016	Mean Spring 2017	Mean change
K grade (*n* = 413)			
Overall	183.09	195.73	12.64
Comprehension	n/a	n/a	n/a
Spelling	n/a	n/a	n/a
Text Fluency	n/a	n/a	n/a
Vocabulary	182.58	197.97	15.39
1st grade (*n* = 482)			
Overall	199.88	213.00	13.12
Comprehension	199.65	217.57	17.92
Spelling	202.07	215.95	13.88
Text Fluency	17.17	26.56	9.39
Vocabulary	204.05	214.56	10.51
2nd grade (*n* = 509)			
Overall	221.90	230.95	9.05
Comprehension	225.89	235.27	9.38
Spelling	221.01	231.04	10.03
Text Fluency	26.37	46.16	19.79
Vocabulary	224.36	236.05	11.69
3rd grade (*n* = 411)			
Overall	234.94	241.28	6.34
Comprehension	237.09	243.29	6.20
Spelling	233.19	241.23	8.04
Text Fluency	51.84	58.16	6.32
Vocabulary	236.20	246.70	10.50
4th grade (*n* = 504)			
Overall	1779.32	1849.06	69.74
Comprehension	1849.74	1934.19	84.45
Spelling	1826.45	1924.29	97.84
Text Fluency	77.11	96.15	19.04
Vocabulary	1671.83	1707.43	35.60

Table 14
Average ISIP performance, 2018-19, by grade

ISIP Subdomain Name	Mean Fall 2016	Mean Winter 2017	Mean change
K grade (*n* = 427)			

ISIP Subdomain Name	Mean Fall 2016	Mean Winter 2017	Mean change
Overall	182.07	198.29	16.22
Comprehension	n/a	n/a	n/a
Spelling	n/a	n/a	n/a
Text Fluency	n/a	n/a	n/a
Vocabulary	183.44	200.52	17.08
1st grade (*n* = 419)			
Overall	200.79	212.04	11.25
Comprehension	202.40	215.60	13.20
Spelling	203.05	213.79	10.74
Text Fluency	23.06	32.85	9.79
Vocabulary	203.96	215.30	11.34
2nd grade (*n* = 413)			
Overall	221.82	232.38	10.56
Comprehension	224.68	236.64	11.96
Spelling	220.46	229.26	8.80
Text Fluency	30.64	45.42	14.78
Vocabulary	226.06	237.74	11.68
3rd grade (*n* = 403)			
Overall	235.79	243.10	7.31
Comprehension	239.19	244.82	5.63
Spelling	234.46	241.14	6.68
Text Fluency	58.00	55.72	-2.28
Vocabulary	240.34	251.05	10.71
4th grade (*n* = 321)			
Overall	1803.73	1907.81	104.08
Comprehension	1895.04	2004.71	109.67
Spelling	1849.21	1953.49	104.28
Text Fluency	98.37	124.61	26.24
Vocabulary	1692.42	1770.55	78.13
5th grade (*n* = 379)			
Overall	1870.55	1934.11	63.56
Comprehension	1933.87	2006.56	72.69
Spelling	1921.60	2004.27	82.67
Text Fluency	100.78	118.25	17.47
Vocabulary	1762.48	1821.17	58.69

Appendix D: Regression Tables

Table 15

Correlations between Grade 2 ISIP and Grade 3 ELA achievement

	ISIP				
Achievement	Overall	Comprehension	Spelling	Text Fluency	Vocabulary
2016-17 ISIP with 2017-18 achievement					
SC Ready	.75	.73	.60	.71	.76
NWEA MAP	.74	.72	.59	.70	.74
2017-18 ISIP with 2018-19 achievement					
SC Ready	.75	.68	.55	.70	.71
NWEA MAP	.75	.65	.55	.67	.74
2018-19 ISIP with Winter 2020 MAP Reading					
NWEA MAP	.78	.74	.65	.69	.74

Note: all observed correlations were significant with $p < .001$.

Table 16

Correlations between Grade 1 ISIP and Grade 3 ELA achievement

	ISIP				
Achievement	Overall	Comprehension	Spelling	Text Fluency	Vocabulary
2016-17 ISIP with 2018-19 achievement					
SC Ready	.66	.61	.52	.45	.71
NWEA MAP	.67	.64	.52	.45	.69
2017-18 ISIP with Winter 2020 MAP Reading					
NWEA MAP	.74	.73	.63	.45	.63

Table 17

Correlations between ISIP usage variables and NWEA MAP reading scores

Grade	Total Usage (minutes)	Total Sessions	Curriculum Usage (minutes)
Spring 2017			
Grade 1	-0.10	0.10	-0.06
Grade 2	-0.11*	0.04	-0.08
Spring 2018			
Grade 1	0.31***	0.30***	0.05
Grade 2	0.00	0.00	-0.09
Grade 3	-0.06	-0.08	-0.11*
Spring 2019			
Grade 1	0.22***	0.18***	0.19***
Grade 2	0.00	-0.01	0.03
Grade 3	0.17***	0.17***	0.20***
Grade 4	0.36***	0.29***	0.35***
Winter 2020			
Grade 1	0.24***	0.17***	0.22***
Grade 2	-0.02	-0.02	0.02

Grade	Total Usage (minutes)	Total Sessions	Curriculum Usage (minutes)
Grade 3	0.14**	0.10*	0.19***
Grade 4	0.23***	0.14*	0.22***
Grade 5	0.10*	0.16**	0.04

Note: * p < .05, ** p < .01, *** p < .001

Table 18

Associations between Istation curriculum usage and MAP reading score, by year

Spring 2017 ISIP Usage	Estimate	Standard error
Mid	1.398	1.675
Mid-high	2.767	1.595
High	1.682	1.578
N (for all analyses)	729	
Model R^2	.430	
Spring 2018 ISIP Usage	Estimate	Standard error
Mid	0.769	1.008
Mid-high	-0.049	0.987
High	0.937	1.111
N (for all analyses)	656	
Model R^2	.737	
Spring 2019 ISIP Usage	Estimate	Standard error
Mid	-0.420	0.947
Mid-high	1.053	0.974
High	3.115**	1.026
N (for all analyses)	1139	
Model R^2	.735	
Winter 2020 ISIP Usage	Estimate	Standard error
Mid	0.348	0.771
Mid-high	0.392	0.778
High	0.768	0.818
N (for all analyses)	1432	
Model R^2	.788	

Note: ** p < .01